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# Implications of the Minamata Convention on Mercury for Informal Gold Mining in Sub-Saharan Africa: From Global Policy Debates to Grassroots Implementation?

S. Spiegel
Centre of African Studies, University of Edinburgh, Chrystal Macmillan Building, 15A George Square, Edinburgh, EH8 9LD UK, sam.spiegel@ed.ac.uk

S. Keane
Natural Resources Defense Council, Washington, DC, USA

S. Metcalf
Institute of Mining Engineering, University of British Columbia, Vancouver, Canada

M. Veiga
Institute of Mining Engineering, University of British Columbia, Vancouver, Canada

**Abstract**
In October 2013, after years of negotiation, governments from 92 countries signed a historic agreement called the Minamata Convention on Mercury, establishing mandatory measures to curb mercury use and pollution. Article 7 of the Convention stipulates that governments must create National Action Plans to reduce and where feasible eliminate mercury use in artisanal gold mining, a rapidly growing informal sector in much of Africa, with strategies to be monitored by the Convention Secretariat. The purpose of this study is to critically analyze the implications of the Minamata Convention for the artisanal mining sector in Sub-Saharan Africa, which currently depends upon mercury amalgamation for gold extraction. Our analysis draws on examples from Zimbabwe and Tanzania, countries with divergent political challenges but both with expanding artisanal mining sectors. We argue that a paradigm shift is needed to address intertwined technological, political and socio-economic challenges facing marginalized populations in mining communities. We highlight why meeting the Convention targets requires that international donors and national policymakers proactively engage - rather than vilify - artisanal miners who use mercury, prioritizing local knowledge and collaborative community-based decision-making to develop effective pollution abatement initiatives in gold mining regions. We further argue that gender-sensitive grassroots empowerment initiatives including microfinance programmes are vital to facilitate adopting cleaner technology, as required by Article 7. Finally, the analysis underscores the need for fundamentally reforming national mining policy priorities, recognizing marginalized mining communities' resource rights and tackling livelihood insecurity as part of efforts to implement the Minamata Convention. In considering what 'grassroots' implementation could mean, the article contributes to a growing body of scholarship calling attention to fairness and equity concerns in order to achieve the aims of global environmental agreements.

## 1. Introduction

In October 2013, government representatives from ninety-two countries signed a binding international agreement to curtail the trade, use and emission of mercury in a wide range of industries (UNEP, 2013a). By agreeing to the Minamata Convention on Mercury – named after the infamous mercury poisoning disaster in Minamata, Japan – governments signaled that mercury's toxic impacts would no longer be treated as simply a national domestic issue. The Convention negotiations made it clear that governments recognized mercury pollution as a transboundary concern due to the behaviour of mercury pollution in the global environment as well as the health risks associated with internationally-traded mercury and mercury-contaminated products (Söderholm, 2013). The Convention emerged after decades of scientific warnings about the environmental and health impacts of mercury pollution and following years of inter-governmental negotiation (Selin, 2014; Selin, 2013; Spiegel *et al.*, 2005; UNEP, 2012a).

Throughout negotiations, reports suggested that the Convention would be a major step forward that could reduce health hazards for millions of people (Kessler, 2013; UNEP, 2013b). From the perspective of international diplomacy, some advocates highlighted the Convention as an illustration of how the Obama administration, after overturning the Bush administration's mercury policies, helped make it possible to reach a previously unattainable global consensus on a major transboundary environmental issue (Campaign for Mercury Free Dentistry, 2009). Prior to 2008, the United States government had strongly opposed a legally binding global mercury Convention, and after the U.S. reversed its opposition, India and China reversed their opposition as well (Selin, 2011; Andresen *et al*., 2013). However, whether the Convention will positively impact the world's poorest populations, who are disproportionately exposed to mercury's negative effects (Sundseth *et al.*, 2010; Pacyna *et al.*, 2010), is still uncertain. Nowhere is this concern more pressing than in Africa's artisanal and small-scale mining sector, which is largely driven by poverty and limited livelihood options, with miners often operating without formal mining licenses (Childs, 2014; Dondeyne and Ndunguru, 2014; Campbell, 2013; Hirons, 2013a; Maponga and Ngorima, 2003; Hirons, 2011). Most artisanal and small-scale gold miners currently depend on mercury use for gold extraction since

amalgamation is the cheapest and simplest extraction method, and safer technology alternatives often are difficult to access (Swain *et al.*, 2007; Davies, 2013; Jønsson *et al.*, 2009; Hilson, 2006; Hilson *et al.*, 2007; Spiegel and Veiga, 2005; Spiegel and Veiga, 2010).

A growing sector in more than 70 countries, the artisanal and small-scale gold mining[1] (ASGM) is the world's largest anthropogenic source of mercury releases to air and water, responsible for more than 1,400 tons of mercury released into the environment annually, posing health risks for miners and downstream communities (UNEP, 2013c). Nonetheless, 80-100 million people around the world rely directly or indirectly on ASGM for their livelihoods (IIED, 2013). A rapidly expanding body of scholarship has been documenting the growth of ASGM in Sub-Saharan Africa as a "poverty alleviation" activity, increasingly highlighting that low-tech artisanal mining is an essential livelihood for rural communities that have found agriculture employment prospects to be critically limited (Bryceson *et al.*, 2014; Maconachie and Hilson, 2011; Fisher and Childs, 2014). The purpose of this article is to contribute to this literature by critically analyzing the requirements of the Minamata Convention with respect to how treaty implementation strategies could affect ASGM in Sub-Saharan Africa, responding to recent calls for more sector-specific analysis of mercury abatement strategies (Bender *et al.*, 2014). In an effort to move beyond common de-politicized policy discourses on balancing social and environmental goals in the extractive sector, our analysis draws attention to complex political questions that are now arising from the Convention, globally and regionally. As such, it also contributes to scholarship on how a global environmental governance instrument could serve as an incentive to operationalize pro-poor socio-economic empowerment initiatives and bring about radical policy shifts on resource rights that are vital for a more sustainable future.

The first section of the article examines the scope of the Minamata Convention, focusing particularly on the Convention's text that mandates that parties to the Convention develop and

[1] As these terms have frequently been debated and their interpretations vary, we follow a long-standing tradition of using the terms "artisanal" and "small-scale" mining interchangeably to refer to small-scale producers' use of rudimentary technologies of mineral extraction (UNEP, 2012b).

implement "National Action Plans" for reducing mercury use and pollution risks in ASGM, under Article 7. We also consider other aspects of the Convention that affect the management of mercury in mining communities, including provisions on mercury trade and financial mechanisms for implementation. The analysis then examines the Convention requirements in the context of insights from past projects designed to reduce mercury use and exposure in small-scale gold mining regions in Tanzania and Zimbabwe, two countries in Sub-Saharan Africa with vastly different political challenges but that both have rapidly growing artisanal and small-scale gold mining sectors. We draw both on research as participant observers during Convention negotiation processes over the official 4-year process of international negotiations (2009 to 2013) as well as our fieldwork in mining communities, including in gold mining regions in Geita District in Tanzania and Kadoma District in Zimbabwe. Zimbabwe and Tanzania, both signatories to the Minamata Convention, were also both part of the Global Mercury Project, a United Nations-led pilot initiative that focused on "removing barriers" (technical, social, economic and legal) to the adoption of cleaner gold mining practices. For the purposes of this examination, the authors analyzed data collected during the course of the Global Mercury Project (2005-2008) as well as in subsequent research (2009-2014) that involved interviewing national policymakers, representatives of microfinance institutions, and artisanal and small-scale miners (both licensed and unlicensed).

The framework for analysis that we propose emphasizes the complex practical and political dimensions of implementing the Minamata Convention, highlighting how the Convention could have positive implications by generating new environmental risk management and capacity-building initiatives, mining policies and outreach approaches for engaging mineral processing workers and others involved in gold extraction. However, the cases that we analyze illustrate that achieving the Convention's goals on ASGM requires broadening policy perspectives beyond simply preventing mercury pollution through technical measures and market-based approaches. Adding to the caution by Wesselink *et al.* (2013) on limitations of environmental governance approaches that do not "actively seek out less dominant, and perhaps even power-less or hidden voices" (p. 7), the analysis below cautions against overemphasis on narrow technical "quick-fix" intervention mindsets rather

than long-term community-based approaches. The article seeks to underscore why researchers and policymakers should seize the opportunity of the Convention to embrace a robust interdisciplinary approach for meeting the inextricably linked livelihood and environmental concerns of marginalized mining populations and others living in mining-affected communities. We further suggest that the Minamata Convention should be understood in relation to wider critiques of the post-2015 Sustainable Development Goals. In particular, our analysis builds on the argument put forth by Kumi *et al*. (2014) in a recent issue of this journal, making the case for an approach that "goes beyond just recognizing the interdependency among social, environmental and economic goals" and "places issues of equity and addressing unfavourable power relations at the centre of interventions" aimed at promoting sustainable development. We situate the Minamata Convention as a global environmental governance instrument that presents a critical point-of-departure for rethinking possibilities for realigning resources to address local challenges.

## 2. The Global Mercury Convention and its Implications for the Gold Mining Sector

For decades, concerns about mercury contamination in the global food supply – especially fish – have led to a burgeoning body of literature on mercury's effects on human health and the environment (Oliveira *et al.*, 2004; Passos and Mergler, 2008). The toxic risks of mercury pollution have been examined in depth both in terms of risks experienced by populations living near local emission sources as well as more dispersed transboundary pollution (Bose-O'Reilly *et al.*, 2010; Taylor *et al.*, 2005; Telmer and Veiga, 2008; Tomicic *et al*., 2011). Both health and environmental risks motivated governments worldwide to negotiate a Convention to curtail mercury use and pollution, after considerable pressure from non-governmental organizations (NGOs). The inter-governmental negotiations concluded in January 2013 with an agreed text; and in October 2013, the Convention was signed by 92 countries in Minamata, Japan, a symbolic location with a powerful history of an unforgettable mercury pollution catastrophe. By March 2014, 96 countries had signed the Convention. The Convention includes provisions to control mercury trade, use in products and industrial processes, emissions to air and water, and, importantly, use in ASGM. The importance of

the ASGM sector was highlighted in the week prior to the final negotiation session, when the United Nations Environment Program (UNEP) published a study reporting that mercury releases in ASGM surpassed emissions from fossil fuel burning, making ASGM the largest anthropogenic source of mercury pollution globally (UNEP, 2013c).

Whereas other mercury-emitting sectors (e.g. coal-fired power plants, non-ferrous smelting) are addressed together under common provisions, negotiators recognized the unique nature of the ASGM sector and the Convention text devotes a specific Article to ASGM – Article 7. Article 7 mandates that countries where significant ASGM takes place "*shall take steps to reduce, and where feasible eliminate, the use of mercury and mercury compounds in, and the releases to the environment of mercury from, such mining and processing*" (Article 7, Paragraph 2). While this clause leaves considerable ambiguity, as "reduction" and "elimination" have vastly different meanings – a point that Davies (2013) aptly emphasizes, Article 7 also stipulates that each party with ASGM in its territory must "*submit its national action plan to the Secretariat no later than three years after entry into force of the Convention*" (Article 7, Paragraph 3b). The Convention text leaves it to countries themselves to create specific priorities for reducing mercury use. How these plans will affect miners and their communities will depend on the institutional approach to developing the plans and the resources (human and financial) dedicated to implementing them.

Two of the most controversial aspects of the Convention negotiation related to ASGM were restrictions on the supply and trade of mercury destined for use in ASGM, and the funding mechanism for Convention implementation. Regarding the supply and trade restrictions, previous discussion on the Convention cautioned that complete bans on mercury use and trade could drive gold mining activities and mercury use underground and hence unable to be regulated (Clifford 2010). Others argued that some restrictions on trade were necessary to put pressure on the mercury price, thus creating an incentive for miners (and other mercury users) to seek alternatives. After considerable debate between policymakers and scientists, Article 3 of the Convention indeed restricts mercury supply by limiting primary mining of mercury as well by requiring "environmentally sound" management of mercury from the decommissioning of chlorine manufacturing plants,

historically a large source of mercury on the world market. Countries exporting mercury are also required to obtain consent from the importing country. These limitations, together with recently enacted bans on the export of mercury from the U.S. and the European Union, are likely to lead to decreased mercury supply to the ASGM sector. However, the trade of mercury is not completely restricted because ASGM is identified in the Convention as a "use allowed" sector, which means that the mercury trade for ASGM is allowed as long as it complies with Article 7. This contrasts with various erroneous media reports that warned that the Convention would require *complete bans* (e.g. Newsday, 2013).

Prior to the signing of the Minamata Convention, Andresen et al. (2013) discussed the perspectives of developing countries' treaty negotiators on the need to leverage "more predictable funding" (p.437) for treaty implementation. It still remains unclear to what extent funding commitments will be made to support ASGM capacity-building activities on the ground; the funding levels and funding strategies continue to be sources of considerable contention. Indeed, according to statements from UN officials, the most contentious point of the negotiation process related to the financial mechanism to support implementation and monitoring of the Convention (Qui, 2013). Governments ultimately agreed to use the Global Environment Facility (GEF) for this purpose. Some delegates – especially from Africa – argued that a stand-alone financial mechanism would have been preferable and superior to the GEF because (1) a stand-alone mechanism would allow specific focus on mercury (rather than all environmental issues covered by the GEF) and (2) parties to the Convention would have more direct influence on how funds were used. A model proposed by some of the delegates from African countries was the Montreal Protocol multilateral agreement. During negotiation sessions, some representatives of developing countries also explicitly stated that the GEF was inefficient and had been slow-moving in past GEF projects on other chemical pollutants. However, representatives of developed countries argued that creating a separate stand-alone fund would require excessive resources (e.g. to set up a separate institution, staffing, etc.), which would detract from funds available for on-the-ground implementation. While funding mechanisms for promoting sound global environmental governance are increasingly debated, limited attention has

been given to financing local grassroots capacity-building with respect to implementing the Convention in the ASGM sector. Notably, in July of 2014, the GEF announced that the GEF6 replenishment set aside $141 million for actions to implement the Minamata Convention, which will likely include some ASGM-related assessment and intervention activities (among other sectors) (Global Environment Facility, 2014), yet little has been said about exactly what amount of funds would be used for on-the-ground ASGM capacity building or what specific kinds of local capacity-building would be funded.

To add substance to Article 7, the Convention includes Annex C which describes the required content of the National Action Plans. The provisions in Annex C are shown in Figure 1. These requirements are both technical in nature (e.g. requiring reductions in mercury use and targeting particularly hazardous practices for elimination) and procedural (e.g. "multi-stakeholder" approach in developing National Action Plans). Whereas the Convention's trade and financial disbursement provisions proved to be highly controversial in the negotiation process, the items listed in Annex C were less controversial, largely because the "National Action Plans" allow a significant degree of flexibility. The development of the action plans might appear to be simple; yet each item in Annex C requires in-depth understanding of the complexity of ASGM and the underlying reasons – social, economic and political – that underpin mercury use. The section below thus analyses some of the complex implications of the Convention for national policy-making processes in the ASGM sector.

**3. What Should Be Prioritized in National Action Plans for Artisanal Gold Mining?**

The Convention implementation strategies for ASGM adopted by national governments could take multiple forms and thus could lead to diverse outcomes. There is a risk the implementation strategies might mirror existing inequities, as mineral processing workers, diggers and ore haulers in artisanal and small-scale mining communities are already widely excluded from national environmental planning initiatives in many African countries (Childs, 2014; Hirons, 2011; Tschakert, 2009; Spiegel, 2009a). At the same time, experiences of marginalization in the mining

sector vary considerably from country to country and from one mining community to the next; experiences of marginalization also vary considerably within any one mining community (Hinton, 2011). Defining priorities for implementing the Minamata Convention in the ASGM sector must take this diversity into consideration, recognizing that processes of distinguishing "legitimate" from "illegitimate" ASGM may be heavily contested in regions where diverse groups of people are involved in artisanal mining. Illustratively, in both Geita District in Tanzania and Kadoma District in Zimbabwe, socially heterogeneous gold mining communities depend on mercury due to the lack of readily available cleaner technologies, and in both cases, droughts, poor agricultural markets and a critical lack of alternative livelihoods have fuelled the expansion of gold mining since the 1980s. In Geita District in northern Tanzania, there are more than 150,000 artisanal and small-scale gold miners, and UN assessments have documented the prevalence of symptoms of mercury intoxication among those involved in mineral processing here, including pregnant women (Chouinard and Veiga 2008). In Kadoma District in Zimbabwe, small-scale mining became a livelihood for at least 20,000 people in the early 2000s (Shoko and Veiga, 2004), with mercury having been used in the Kadoma region for at least 100 years; due to Zimbabwe's ongoing economic and political crisis, gold mining has become increasingly a survival strategy for at least 1 million people nationally. In Zimbabwe, women make up an estimated 50% of artisanal mining populations, and in Tanzania, estimates suggest that 25% of the ASGM labour force comprises women (Hinton *et al.*, 2006).

In response to the requirement to include measures to "eliminate" hazardous practices, as required by paragraph 1(b) of Annex C (Figure 1), some government agents may be tempted to implement laws that immediately criminalize particular practices such as "whole ore amalgamation" – the application of mercury to all ore rather than just a concentrated portion of ore. This is a practice that is particularly prevalent in Zimbabwe, but also, to a lesser degree, in Tanzania too. Past research in Africa has emphasized, however, that short-sighted policing-oriented approaches can backfire from an environmental perspective, as the demonization of mercury use and criminalization of ASGM can drive mercury use into unregulated contexts, exacerbating exposure (Tschakert and Singha, 2007; Clifford, 2010). In Zimbabwe, heavy-handed police

crackdowns on gold miners were used widely by state authorities between 2006 and 2009, ostensibly in the name of protecting the environment, and had negative environmental and social repercussions, weakening trust between regulators and low-income mining communities (Spiegel, 2009b; Spiegel, 2014a; Spiegel, 2014b; Kamete, 2008). More than 30,000 artisanal and small-scale gold miners and traders were arrested in this period, as part of a policing operation called "Operation Chikorokoza Chapera" ("No More Illegal Mining"). Some primary ore miners whom we interviewed during this operation acknowledged that they had turned to environmentally hazardous practices of riverbed panning, or worked at night, to avoid police surveillance. Dondeyne *et al.* (2009) documented similar problems related to policing ASGM near the Mozambique-Zimbabwe border on the Mozambique side, where problems with policing were linked with human rights concerns and further environmental degradation. Given ongoing controversies, and the fact that control of mineral resources - by political elites (and, in some cases, multinational corporations) - remains "an essential source of power and privilege" (Kumi et al., 2014), there is a risk that some policymakers might seize upon ambitious mercury reduction targets as a rationale for harshly policing artisanal and small-scale mining communities rather than investing in long-term strategies to work with such communities. This concern was also expressed explicitly during a UN Global Forum on ASGM held in the Philippines, in December 2010, when two representatives of artisanal mining associations from Tanzania were invited by UNEP, highlighting the importance of engaging miners in mercury abatement strategies. The associations advocated that communities that depend on artisanal mining must be empowered to improve their livelihoods in order for cleaner technologies to be embraced widely. The analysis below discusses key dimensions that need careful consideration when developing and monitoring the National Action Plans to comply with Article 7 of the Minamata Convention, to facilitate the paradigm shift needed for effective grassroots implementation of this treaty.

### 3.1. Prioritising Local Knowledge in Safer Technology Decision-Making and Capacity Building

To implement the Minamata Convention, instead of criminalizing mercury use nationally (a "restrict supply" approach), a more effective approach in numerous settings would likely be reducing mercury demand by improving local mining technologies and practices emphasizing low- or no-mercury methods, while concurrently raising awareness about the hazards of mercury. The first major theme emerging from analyzing experiences in both Zimbabwe and Tanzania (including UN pilot projects[2] and their legacy) is the need to *prioritize local knowledge in technology decision-making and capacity-building*, recognizing that the relation between "local knowledge" and "technical knowledge" should not be treated as a dichotomy (Negev and Teschner, 2012). To craft effective mercury reduction strategies, efforts to promote cleaner technology need to be grounded in knowledge about rural social contexts and local technological capabilities rather than focused on abstract global technical practices. To expand upon Article 7 and Annex C, governments may wish to consult international technical guidance materials such as the *International Guidelines on Mercury Management in Small-Scale Gold Mining* when designing interventions in the sector. These guidelines, although general and abstract, were introduced by the United Nations Industrial Development Organisation (UNIDO) to provide a framework for discussing different local and regional scales of responsibility, including mine managers, ore excavators, gold processers, traders and different kinds of government actors, and for considering how technology priorities identified locally could inform national policy. However, these and other general guidelines should be considered a mere starting point for designing interventions. Policymakers often look for "silver bullet" solutions that do not exist; technology options and environmental health promotion strategies need to be informed by a nuanced appreciation of local challenges. Recent ASGM literature has been calling for more study to appreciate local realities; the point, however, is that developing strategies for this sector must move beyond simply *assessing* local contexts to meaningfully *involving* mining

[2] Chouinard and Veiga (2008) provide details on the nature of six UN pilot projects, including in Geita and Kadoma, which combined training activities and risk awareness in mining communities as well as capacity-building with government officials.

communities themselves who are familiar with the specific ores being mined and the social dynamics of technological decision-making at the grassroots level.

A highly debated example in this regard is the promotion of retorts – devices to capture and condense mercury vapour and thus prevent mercury releases into the environment – a priority under Annex C paragraph 1(b). In UN-sponsored pilot projects, retorts were made from simple salad bowls and pipes and were shown to be partially effective in reducing exposure – even sometimes capturing for re-use as much as 95% of mercury "burned" (Spiegel *et al.*, 2006). However, there is considerable disagreement in the scientific community about the extent of their effectiveness as well as the degree to which miners find them feasible to use (Hylander and Goodsite, 2005; Appel and Na-Oy, 2013). Retorts do not always succeed at preventing exposure or emission, and faulty designs may contribute to a lack of trust. Our experiences observing retort promotion programs in Zimbabwe and Tanzania suggests that problems emerge when foreigners introduce retort designs without taking into account the local retort costs or without carefully thinking through who manages the retorts in the mining community and the various reasons why miners and mineral processors might not trust the technology. Indeed, as Jønsson *et al*. (2012) stress in a recent review of retort promotion activities in Tanzania, there are four main reasons why artisanal miners have been reluctant to adopt retorts: 1) miners believe that retorts could reduce the gold weight and give them a lower gold recovery; 2) retorts sometimes prevent transparency, as some retorts block the viewing process and lead to suspicion between retort owners and miners with a share in the gold; 3) retorts result in a longer amalgam burning time; and 4) retorts are simply unavailable due to the lack of local manufacturers or sellers in the region. Jønsson *et al.* (2012), focusing on Lwamgasa, in the north of Tanzania, suggests that the first three factors are considerably more important than the fourth, as donor-government partnership projects visited the Lwamgasa region several times and left retorts behind. Past failed efforts at promoting retorts illustrate that policymakers must recognize that theoretical ideas about mercury capture may simply not play out well in the local reality of artisanal miners' field circumstances - and instead must prioritize involvement of the local community in processes of technology adaptation.

Similarly, when developing plans to eliminate whole ore amalgamation, collaboration is needed to choose the appropriate replacement. Developing centralized ore processing centres with cyanidation techniques could be one option, and ongoing donor-funded projects are exploring the viability of shifting from mercury amalgamation to gravity separation and cyanidation methods (Velásquez-López *et al.*, 2011; Veiga *et al.*, 2014). Yet, cyanidation plants often require significant financial investment and technical expertise, and the organization of labour around centralized processing centres needs to be planned carefully. Combining mercury and cyanide can prove to be a particularly dangerous practice (Veiga *et al.*, 2014), and Article 7 in the Convention was designed with this risk in mind, recognizing that a gradual reduction of mercury use may be better than a fast-paced campaign to create new cyanidation plants. Switching to a mercury-free gold extraction method requires not only significant investment and training, but may also pose a radical departure from existing labour arrangements in rural communities where gold miners and millers have long grown accustomed to particular ways of dividing labour and profits. In a common milling centre labour practice in Zimbabwe, miners (who bring ore to the mill) keep only the gold amalgamated in the primary concentration stage, while the millers (who own the mill) keep the tailings (that contain 70% of the gold values in the ore) for cyanidation, in exchange for below-cost milling fees (Metcalf and Veiga, 2012). This practice is arguably economically exploitative as well as environmentally precarious, but careful attention to local power dynamics are required if milling centres are to change.

There is widespread consensus among researchers studying the ASGM sector that initiatives to reduce pollution are more effective when integrated with improving risk awareness, sustainability and efficiency of gold extraction as well as strategies for maximizing benefits of mining to communities. Projects sponsored by UNIDO and implemented in Zimbabwe and Tanzania adopted the slogan “less mercury, more gold and better health” and provided training to regional environmental and health authorities as well as technology manufacturers in mining districts, creating avenues for transforming both awareness and technology in remote mining communities where ASGM activities were becoming increasingly prevalent, including Geita and Kadoma

(Chouinard and Veiga, 2008). The experiences also demonstrated the importance of embracing innovative methods to communicate important messages about mercury risks, ensuring culturally appropriate approaches. Such risk communication is required by 1(j) in Annex C of the Convention, which mandates *"[s]trategies for providing information to artisanal and small-scale gold miners and affected communities"* but these strategies can take diverse forms. In the pilot project in Kadoma, local artisanal mining associations and community theatre groups sought to raise awareness of the rights of mining communities in Zimbabwe while promoting education on mercury risk management strategies. A theatrical play was held in 2007 to encourage dialogue between artisanal gold miners, farmers and others in the community who were affected by mercury use. It adapted the narrative of Romeo and Juliet to illustrate the challenges experienced by local farmer's daughter and local miner's son who fell in love but had to deal with tensions in the community about toxic risks from mining. This approach for community outreach represents an alternative to the more technically-oriented education strategies that have conventionally dominated pollution abatement efforts.

The important principle here is that interventions must not only be tailored to the specific needs of communities, and not assume that one-size-fits-all, but heed the voices from marginalized communities. As noted by Wesselink *et al.* (2013), there is a danger that "expert" policy discourses "become dominant and suppress alternative discourses and related knowledge claims and governance practices." A commonly held view among policymakers is that miners are not aware of the risks associated with mercury; yet, although a "lack of risk awareness" may be one of the challenges in many cases, some artisanal gold miners are in fact deeply aware of mercury risks and also very much aware of technology options to reduce mercury use and improve gold production efficiency - for such communities, the major challenge may be one of technology access and socio-economic empowerment. In these circumstances, raising awareness about the toxicity of mercury will not be an effective intervention absent concrete measures to improve access to alternative technologies. Therefore, the second major strategy consideration is *grassroots social and economic empowerment in mining areas,* as discussed next.

### 3.2. Engage Mining Communities through Social and Economic Empowerment Initiatives

Whereas reports on illegal artisanal mining frequently conclude by emphasizing (sometimes appropriately) the need for strict enforcement of hazardous substance laws, there is increasing recognition by ASGM researchers that policymakers need to be more sensitive to socio-economic challenges faced by people living in artisanal mining communities. Our analysis indicates that context-specific regional strategies for *economic* empowerment as well as health promotion initiatives are needed even - and *especially* – in conditions where the line between "legality" and "illegality" is unclear or disputed. Empowerment for women miners is particularly critical in the context of the Convention. As Annex C mentions, women are a particularly vulnerable population to mercury toxicity. Women often work in dangerous amalgamation jobs that make them particularly at risk to mercury exposure. Women are widely responsible for amalgamation pools in gold mining communities in both Geita and Kadoma, whereas men are largely responsible for the digging, tunnel mining activities and transportation of ore. Also, women are often particularly disadvantaged by existing mining licensing policies, usually mining without licenses; a growing body of research documents how women are widely excluded from mining sector development initiatives in both Zimbabwe (Murungu, 2013) and Tanzania (Msechu, 2013). Developing specific initiatives for empowering women in artisanal communities is therefore a particular priority in Convention implementation processes - including not only risk awareness-raising campaigns targeted to women but also economic empowerment that can enable women to improve livelihoods.

One concrete way of empowering women is to support community-based savings and credit programs in mining regions, specifically designed to target women in mining communities. In our interviews with artisanal miners in both Zimbabwe and Tanzania, an especially important and reoccurring "long-term empowerment" theme centered on micro-financing. Mining sector microcredit programs have been tested on a trial basis in Sub-Saharan Africa, but donor agencies have invested only minimally in ASGM microcredit programs (Spiegel, 2012; Hilson and Ackah-Baidoo, 2011). Reports have suggested that innovative arrangements should be pursued as a way of

mobilizing savings and acquiring credit to finance technologies that reduce mercury use and enhance production (Hayes and Van Wauwe, 2009). Grameen-bank style microcredit - involving solidarity groups and peer accountability mechanisms to ensure repayment - could be one strategy that governments consider to empower women (and others) in mining communities. UNIDO explored the initial development phase of such a programme (Spiegel and Veiga, 2007), but the project itself never evolved to a community-based microfinance programme. Debates continue about such initiatives. The Minamata Convention mentions "market-based" mechanisms explicitly (Annex C, Paragraph 2); however, policymakers with whom we spoke during negotiation sessions had differing views on whether this should primarily mean "fair trade certification" initiatives or targeted microfinance projects – and in what ways microfinance projects should or should not be primarily "market-based." In discussing microfinance with policymakers from mining and environment ministries, views also diverged on whether microfinance projects should strictly target the empowerment of small-scale miners who already possessed mining licenses and some basic mining equipment or also include workers who labored more "informally" as mineral processors and did not themselves own equipment, who often constitute the majority of people involved in ASGM.

In conceptualizing the Minamata Convention as a potential opportunity for new forms of donor and policy engagement on microfinance, it should be stressed that too much focus on market-driven solutions can crowd out the "pursuit of explicit development goals" in microfinance programmes (Copestake, 2007, p. 1721). There is currently a notable debate in the literature on artisanal mining as to whether donors and policymakers should consider offering subsidized loans to artisanal miners as part of a microfinance strategy. On one hand, Hilson and Ackah-Baidoo (2011) argue that subsidized loans (with lower interest rates than regular commercial banking models) would generally not be a good strategy at stimulating "fiscal discipline" among the poor in African mining contexts, pointing to the risks of non-repayment. On another hand, with a different emphasis, the analysis by Spiegel (2012) suggests that there may be cases where subsidized micro-loans to artisanal miners could play a role in facilitating the transfer to better (cleaner and safer) equipment and enhanced livelihoods, stressing that conventional commercial banking models of microfinance

have proven to be elusive to the poorest segments of the ASGM sector. As such, donor-supported programmes could play a role in supporting experimentation with non-conventional micro-lending models (that go beyond market-driven commercial banking schemes), provided that sufficient local training measures are in place to build capacity and mobilize savings among participants. In Tanzania, we found that high interest rates at banks, lack of subsidies (which could reduce rates), excessive collateral requirements and inflexible repayment options were frequently identified as barriers to credit access in the ASGM sector, and some microfinance banks only worked with clients with proven track records. The Tanzanian Women Miners Association has argued, for example, that they should be allowed to use their existing licences (in the cases where artisanal miners have them) as collateral and asked the government to work with banks to facilitate credit access. The Zimbabwe Rural Women in Mining Association has likewise argued that conventional banking models have been insufficient in meeting the needs and realities of women miners. In an interview conducted in February 2013, the President of the Zimbabwe Rural Women in Mining Association stressed that both private sector microfinance institutions and government lending institutions (which offer equipment loans and cash loans) have poorly understood the potential that women offer in Zimbabwe's growing ASGM sector, emphasizing the social benefits that micro-empowerment initiatives could bring to "create a multiplier effect to benefit more women across entire societies."

This is not to say that microfinance is a panacea. Not only have researchers cautioned that microfinance can cause the poor to accumulate excessive debt, especially without proper training on financial management (Fernando, 2006), past research also suggests that poorly devised microfinance programmes can sometimes exacerbate - instead of mitigate – pollution, as Lal and Israel (2007) have argued in the context of small-scale agricultural microfinance. Moreover, global discourses of economic empowerment through microfinance often mask the larger structural issues that need to be addressed including inequitable trade arrangements, unequal distribution of resources and denial of social rights, as noted for example by Bond (2007) and Roy (2010). Our point here is to emphasize that these critical concerns deserve context-specific attention, and policymakers should judiciously weigh the benefits of different microfinance paradigms in the implementation of the

Minamata Convention. Notably, empirical evidence elsewhere has suggested that providing longer grace periods for loan repayment can help microfinance programmes to stimulate investment and contribute to poverty alleviation, even with the risk of more defaults (Field *et al.*, 2013). Joint liability group lending mechanisms could be particularly important to overcome collateral requirements for micro-loans. Often such models involve lending on the basis of using multiple person group guarantees, whereby each individual is responsible for the others and future access to credit requires that all members repay loans. Learning from the field is essential here. In Tanzania, examples of where artisanal mining communities themselves formed savings and credit organisations were found in Geita District. One such example was a group called Tupendane, consisting of 40 artisanal and small-scale miners who formed a Savings and Credit Cooperative Society (SACCOS); located 50 kilometres outside Geita town, Tupendane started by raising, through share sales, $7,000, and after four years of working together, had built a modern office and had $5,300 in the bank. Another example, however, was a SACCOS called Mshike-Mshike, based in Mgusu small-scale mining site, 25 kilometres from Geita town. Most of its 18 members were not licenced miners but workers who retreat tailings in the Mgusu mining area. They started the SACCOS with $940 raised through the sale of shares to its members, but their lack of access to mining licenses precluded efforts by formal microfinance institutions to invest in long-term financing programmes for technology change (personal communication with Tanzanian mining consultant for the UNIDO Global Mercury Project). Our analysis clearly indicates that economic empowerment schemes must move beyond purely market-based models that have tended to benefit the wealthy and the well-connected, offering little to those most in need of assistance for implementation of the Minamata Convention. There is, at the moment, considerably uncertainty as to how donors and policymakers will address these issues.

Furthermore, a key area of "uncertainty" identified in both Zimbabwe and Tanzania is whether short-term development interventions can lead to sustained empowerment of rural communities beyond the project time-scale. In the countries where UNIDO had pilot initiatives as part of the Global Mercury Project (Zimbabwe, Tanzania, Indonesia, Lao Peoples' Democratic

Republic, Indonesia and Brazil), governments tended to devote little resources for empowering artisanal mining communities. Moreover, the international donor funding in this project was heavily focused on diagnostic assessments between 2002 and 2005, leaving little resources for focusing on "solutions-oriented" technological capacity-building activities let alone local socio-economic empowerment between 2005 and 2007. In these initiatives, locally based groups of environmental health trainers (who lived in gold mining areas) were funded to build artisanal miners' capacities for minimizing mercury use, but these efforts were not followed with long-term targeted funds for outreach activities to ensure the sustainability of the intervention efforts beyond the conclusion of the project in 2007. Of six countries involved in the Global Mercury Project the only two countries that received further UN funding to conduct follow-up artisanal mining mercury reduction programmes (between 2007 and 2013) were Indonesia and Tanzania. While Annex C of the Minamata Convention requires baseline assessments related to quantifying mercury use in ASGM and related health data gathering, experience from the pilot projects suggests that technical expert assessments, while valuable, must lead quickly to investing resources into community-based empowerment initiatives. Planners and policymakers need to be cognizant of the limited resources that are available and ensure that they promptly engage local participants in priority-setting. However, local engagement on pollution abatement and socioeconomic empowerment programs, while necessary, will likely not be sufficient – more fundamental reforms are needed to shift from purely growth-focused development policies to more pro-poor paradigms that sensitively address "power relations and dynamics across different groups" (Kumi *et al.* 2014, p.11) in order to promote sustainable Convention implementation, as discussed next.

### 3.3. Tackling Inequities in Mining Policy as Part of a Mercury Strategy

Although paragraph 1(g) in Annex C of the Convention requires multi-stakeholder engagement, many national mining sector development strategies in Africa have long tended to focus on the expansion of large-scale mining instead of artisanal mining, partly as a result of Economic Structural Adjustment Programmes (ESAPs) adopted in the 1990s (Campbell, 2013). Our research in

Tanzania and Zimbabwe dovetailed with the recent findings of other scholars, namely that in both Tanzania (Bryceson *et al.*, 2014; Emel *et al.*, 2011) and Zimbabwe (Bhatasara, 2013) artisanal miners often compete with larger companies for the same mineral rights, and often are ostracized due to national mining policymaking processes that are detached from rural district development priorities. Implementing Article 7 of the Minamata Convention requires a careful shift in focus not only to extend beyond technical considerations to social concerns, but also from a dominant focus in policymaking circles on large-scale mining to proactive engagement with ASGM in rural districts. In both Zimbabwe and Tanzania, mercury use is not technically illegal at present (as long as miners comply with national regulatory codes), but years of national policies favouring large-scale mining have created barriers to the regularization of ASGM, resulting in bureaucratic licensing procedures and, in some cases, prohibitively costly fees for registering with national authorities. The third critical lesson that we derive is therefore the need to adopt an *equity-sensitive approach* when amending national mining policies. Philosophically, the signing of the Minamata Convention could be a defining moment where policymakers commit not merely to technical approaches for hazard reduction but also to the promotion of equitable opportunities and rights in mining communities. Article 7 creates unique opportunities for rethinking mining sector priorities, as Annex C includes a complex but symbolically important measure that could benefit ASGM communities, by stipulating that governments (in countries where mercury is used in ASGM) must take steps to "*facilitate the formalization or regulation of the artisanal and small-scale gold mining"* (Paragraph 1(c) Annex C). What this means in practice is highly disputed, as "formalization" remains undefined.

Because competition between large-scale multinational companies and artisanal miners for land rights complicates efforts to manage mercury risks, in order to implement its Minamata Convention obligations, government agencies need to exercise political will to re-negotiate resource access rights in contested lands. This has been a particularly important lesson learned in Tanzania, where most of the country's mining licenses are held by multinational mining companies (UNEP, 2012b; Bryceson et al., 2014; Spiegel et al., 2014). In Geita District in northern Tanzania, access to licenses is inhibited by multiple factors – in particular, national mining laws do not recognize the

types of poverty-driven "artisanal" mining being conducted in marginalized rural areas, while instead promoting licensing schemes for medium and large-scale mining businesses. While Tanzania's 2010 Mining Act stipulates that the Minister of Energy and Minerals has the power to declare "an area to be exclusively reserved for allocation to small scale mining,"[3] there have frequently been complaints that the government's designated "small-scale mining areas" tend not to be in the most desirable locations for artisanal miners. In the case of a mining area called Mgusu, UNIDO attempted to provide education and training services to minimize mercury use, but the ambiguity over who had the "right to mine" - artisanal miners or a medium-scale mining company – prevented the delivery of outreach initiatives, highlighting why national mining policy has considerable importance for mercury abatement.

In 2008, a government review in Tanzania (the Bomani Review Committee) noted that, throughout the country, there have been numerous "complaints that small miners are usually allocated tiny mining sites that make it difficult to operate without interfering with each other" (Bomani Commission, 2008, p. 24). In an effort to reverse this trend, the Tanzanian Women Miners Association (TAWOMA) has been active in advocating for reducing non-transparent practices of mining sector licensing and making the mineral licensing schemes less biased in favour of multinationals so that artisanal miners can focus on technology improvements (Shekighenda, 2012). The advocacies of TAWOMA recognize explicitly that pollution reduction efforts in the mining sector are limited if they do not take into account the politics of local contexts and regional struggles over resource access and distribution. While the Convention negotiations mainly involved officials from Environment Ministries, most of the government officials who preside over mercury-emitting activities are from Mining Ministries. Inter-ministerial dialogue is necessary if long-term technology improvements are to be made. Although the Minamata Convention does not prescribe exactly who will be involved in designing mercury reduction strategies, robust discussion on Convention implementation with mining authorities, environmental policymakers and local stakeholders could

[3] 2010 Mining Act, Part II, Clause 15.

play a significant role in better understanding the regionally complex challenges that artisanal miners face in conditions where large-scale mining companies compete for the land access rights.

Ultimately, a social equity-focused orientation to implementing Article 7 of the Convention would be beneficial by drawing attention to local community-level challenges and stimulating new policy options for mitigating tenure insecurities. Currently, inequities in mining policy often arise because of the widespread lack of legal recognition of artisanal mining and this inhibits long-term environmental planning and the development of technical support services for artisanal mining populations. Limited legal definitions are often such that low-tech forms of artisanal mining are not recognized in regulatory frameworks, as in Zimbabwe where riverbed panning used to be legalised (Maponga and Ngorima, 2003), but is now criminalised, following a repeal of Statutory Instrument 275 (Alluvial Riverbed Panning Regulations, 1991 Mines and Minerals Act) in 2006. As noted by Bhatasara (2013) (in a discussion of granite mining) in a recent issue of this journal, revising the Mines and Minerals Act in Zimbabwe is an urgent priority to reverse the institutionalised exclusion of local communities. Our interviews with miners in Zimbabwe also emphasized the costly and ineffective Environmental Impact Assessment (EIA) process, suggesting the need for a drastic overhaul of Zimbabwe's EIA system. In particular, interviews with members of the Zimbabwe Artisanal and Small-Scale Mining Council stressed the need for government support to conduct group EIAs in ASGM regions, which would be more efficient and effective than individualised EIAs for ASGM operation; interviewees widely emphasized that this could help to ensure that EIAs and Environmental Management Plans more clearly address mercury management practices on the ground. As part of an effort at implementing the Minamata Convention, government agencies could revisit these suggested reforms and create new avenues for licensing artisanal miners along with technology capacity-building.

Despite political differences between the two countries (a full discussion of which is beyond the scope of this article), interviews with national government mining officials in both countries also suggested that regulatory reforms to the ASGM sector can and should be buttressed by new forms of direct government engagement with the large-scale private sector. In 2009, the International Council

on Mines and Metals (ICMM), which represents multinational mining companies, publicly committed to strategies for "working together" with artisanal mining communities, recognizing that the global reputation of companies and government authorities is jeopardized when security forces attempt to evict local mining populations. ICMM's influential 2009 report on artisanal mining stresses that some companies have found it beneficial to form partnerships with artisanal miners to create mutually productive relationships, prevent conflict and improve local environmental management strategies (ICMM, 2009). Governments need to rigorously monitor these types of partnerships, as private sector reporting does not always capture the realities on the ground and can sometimes be "misleading, ambiguous and omissive" (Emel *et al.*, 2012, p. 257). While contemplating the Minamata Convention's implications for artisanal miners, governments could and should play a role in monitoring mining sector partnerships, independently promoting licensing opportunities for artisanal miners, mediating conflicts and creating new training services as part of an integrated strategy for reducing mercury use and promoting well-being in the sector overall.

## 4. Conclusion

Active involvement of marginalized populations is crucial both to the legitimacy and effectiveness of global environmental governance processes. Recent reviews of other major international environmental agreements such as the Reducing Emissions from Deforestation and Forest Degradation (REDD) initiative suggest that recent global policy developments risk further marginalising and criminalising the ASGM sector in Africa (Hirons, 2011; Hirons, 2013b). This article examined some of the key implications of Article 7 in the Minamata Convention in order to contribute to an understanding of how artisanal gold mining communities could be engaged in the processes of implementing this new treaty in a manner that avoids further marginalization and criminalisation. In both Zimbabwe and Tanzania, the ASGM sector is growing and encompasses miners and mineral processing workers from diverse socio-cultural backgrounds. Mercury reduction plans need to be based not only on context-sensitive approaches, supported by dialogue across government ministries and across academic disciplines, but also infused with a critical awareness of

the limitations of top-down technical solutions and mainstream market-driven approaches to realize the goals of pro-poor sustainable development. Researchers have a role to play in communicating research findings not only to national environment, health and mining ministries but also to local government authorities and artisanal mining associations who can support dialogue with mining populations. Different scales of governance as well as equity and power relations in the mining sector need to be considered carefully if pollution abatement strategies are to be effectively promoted in mining communities.

By approaching mercury as a global issue, policymakers who signed the Minamata Convention have signaled that they will be getting tough on mercury use, trade and pollution. While sustainable development scholars are now stressing increasingly why "equity and fairness need to be at the heart of strong and durable international regimes" (Biermann *et al.*, 2012), we have argued that debates about implementing the Minamata Convention should carefully be guided by questions of equity and fairness in some of the most remote and marginalized mining communities in the world. Zimbabwe and Tanzania are just two examples of countries with growing mining sectors; while challenges in these countries are politically unique in certain ways (e.g. as discussed, Zimbabwe's recent police crackdowns in the ASGM sector have been particularly severe, and Tanzania's mining reforms have widely been criticized by small-scale miners' associations for empowering multinational companies at the expense of artisanal miners), the challenges of implementing the Minamata Convention in these contexts are not entirely dissimilar to those in other countries. Just as policymakers need to be open to dialogue with affected communities when designing Convention implementation strategies, researchers need to avoid the kind of "fly-by research" styles that have often typified short-term research and donor consultancy work on gold mining and mercury exposure in the past. Long-term initiatives are crucial and, to be effective, policy should be steered by critical research focusing on local rural realities. Now more than ever, it is imperative that national policymakers not only take into account the rights of marginalized groups but also involve such groups in creating pro-poor policies.

As such, we conclude by returning to two unresolved issues in implementing the Minamata Convention. First, how will the GEF and other donors support governments in practice to tackle the issues identified in this study? We have proposed a framework addressing i) local knowledge in capacity-building programmes and engaging local artisanal mining communities in decision-making on mercury abatement; ii) supporting women in artisanal mining areas through economic empowerment initiatives that are not solely market-driven; and iii) radically reforming national mining policies. The specific level and nature of donor funding commitments for local ASGM capacity-building still remain uncertain, and governments in poorer countries have yet to clarify what kinds of National Action Plans they will be crafting. Sustainable development researchers have a vital role to play in critically informing and responding to strategies they develop. Secondly, how will the Minamata Convention Secretariat monitor progress in compliance? This study provides a foundation to begin the debate on these issues as they relate to the ASGM sector, and here researchers have an important role to play as well. Ultimately, the Minamata Convention represents a historic breakthrough at a broad inter-governmental level, but it will only be effective if the global community commits to supporting bold actions for tackling the social, economic and political barriers to improved ASGM practices on the ground.

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**Figure 1: Text from Annex C of Minamata Convention - National Action Plans on Artisanal and Small-Scale Gold Mining**

*1. Each Party that is subject to the provisions of paragraph 3 of Article 9 shall include in its national action plan:*

*(a) National objectives and reduction targets;*

*(b) Actions to eliminate:*

*(i) Whole ore amalgamation;*

*(ii) Open burning of amalgam or processed amalgam;*

*(iii) Burning of amalgam in residential areas; and*

*(iv) Cyanide leaching in sediment, ore or tailings to which mercury has been added Without first removing the mercury;*

*(c) Steps to facilitate the formalization or regulation of the artisanal and small-scale gold mining sector;*

*(d) Baseline estimates of the quantities of mercury used and the practices employed in artisanal and small-scale gold mining and processing within its territory;*

*(e) Strategies for promoting the reduction of emissions and releases of, and exposure to, mercury in artisanal and small-scale gold mining and processing, including mercury-free methods;*

*(f) Strategies for managing or preventing the diversion of mercury and mercury compounds to use in artisanal and small-scale gold mining and processing;*

*(g) Strategies for involving stakeholders in the implementation and continuing development of the national action plan;*

*(h) A public health strategy on the exposure of artisanal and small-scale gold miners and their communities to mercury. Such a strategy should include, inter alia, the gathering of health data, training for health-care workers and awareness-raising through health facilities;*

*(i) Strategies to prevent the exposure of vulnerable populations, particularly children and women of child-bearing age, especially pregnant women, to mercury used in artisanal and small-scale gold mining;*

*(j) Strategies for providing information to artisanal and small-scale gold miners and affected communities; and*

*(k) A schedule for the implementation of the national action plan*

*2. Each Party may include in its national action plan additional strategies to achieve its objectives, including the use or introduction of standards for mercury-free artisanal and small-scale gold mining and market-based mechanisms or marketing tools.*